

# LaRC GIS Overview



NASA Langley Research Center

November 2009

*gis-www.larc.nasa.gov*

Brad Ball

William.B.Ball@NASA.Gov

# LaRC GIS Overview

LaRC GIS Business Plan 2.0



NASA Langley Research Center  
Hampton, Virginia

Prepared by the Geographic Information Systems Team

March, 2004

## Infrastructure

Master Plan

Real Property

Utility systems

Facility Full Cost

Work Permit Process Management

Maintenance Management

Environmental

Space Utilization

Facility Reduction Planning

## Science, Space, other

Aviation Safety/Synthetic Vision

Biomass Burning Analysis

# Background



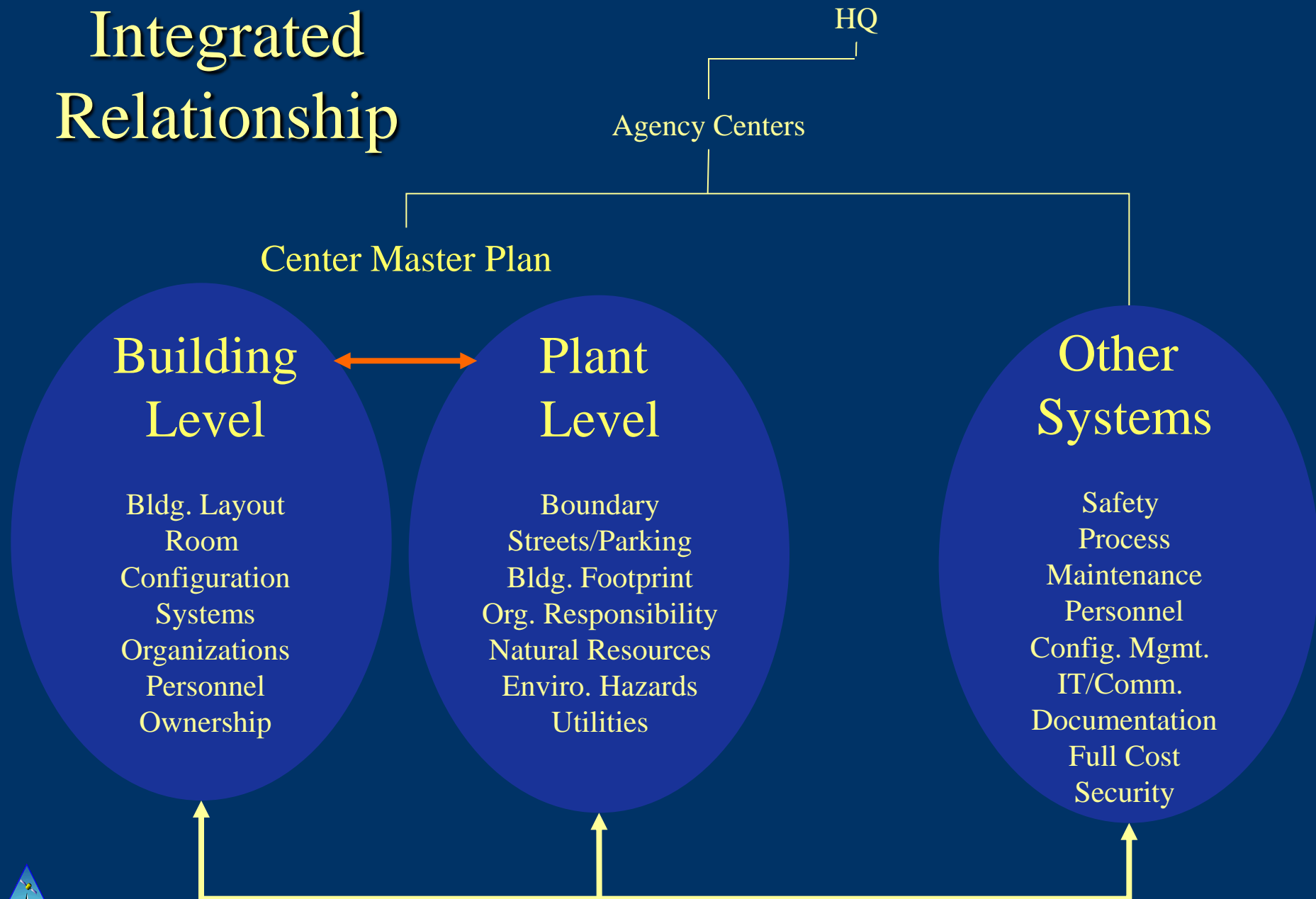
# Background

- Langley Research Center
  - 300 Buildings
  - \$2.9 B Current Replacement Value (CRV)
  - 6,000 rooms, 3.8 M gross sq. ft.
  - 3,900+ Personnel

# Background

- GIS Team
  - GIS emphasis since ~1990
  - 3 FTE CS, ~10 WYE Cont, 9-18 Intern
  - \$500+K LaRC, ~\$1+M Partnering projects
  - Building level data management ~12 years

# Integrated Relationship





# Goals for LaRC GIS Team

- Eliminate Redundancy

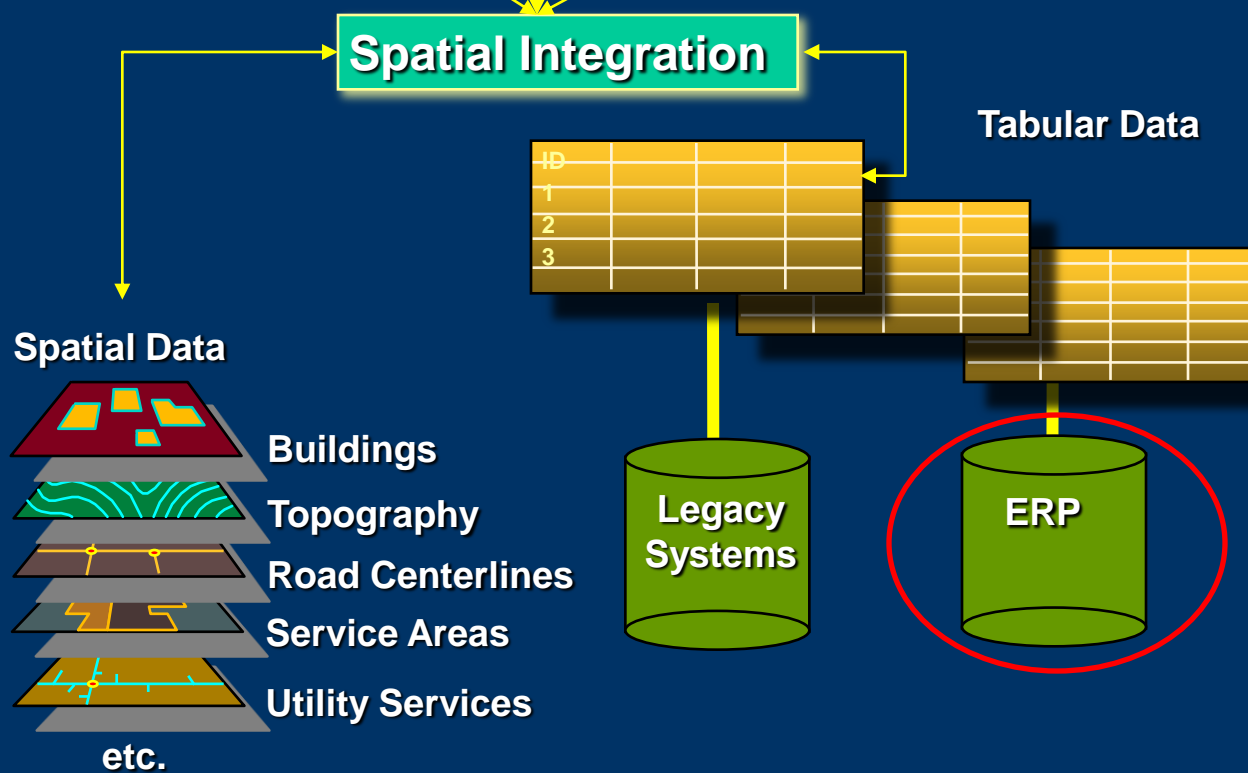
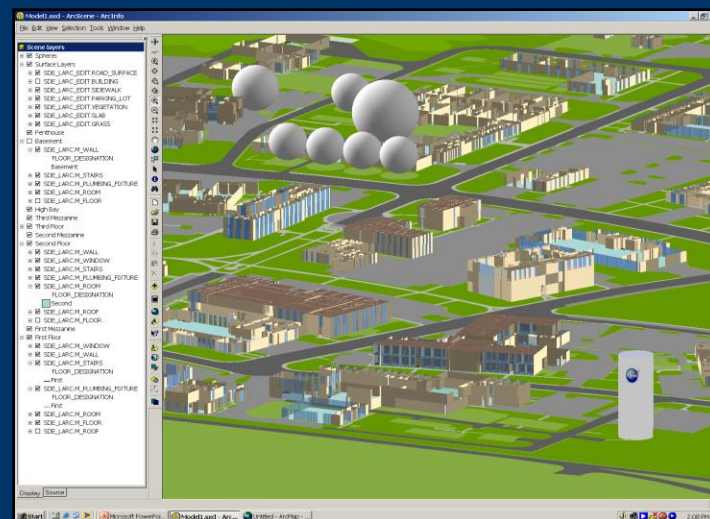
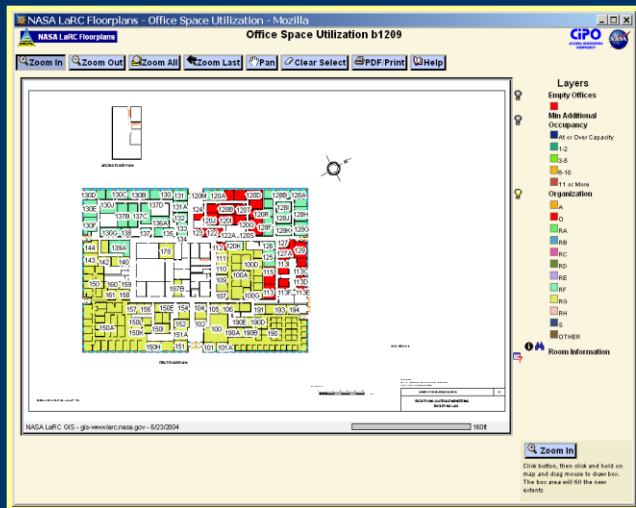
- Increase Accuracy

- Increase Accessibility

- Increase Effectiveness

- Enterprise System Interface











# Most stringent requirements



## Geodetic Control & Air Photo

- high resolution/accuracy
- geo-referenced
- data overlays
- data generation









# Facility / Utility Management

The screenshot displays a GIS application interface for Facility / Utility Management. The main map area shows a site plan with buildings (orange polygons) and utility lines (blue and red lines). A red arrow points to a specific utility line on the map. The Identity Results window is open, showing the details for a selected feature (b1272) in the DRAIN layer. The table below lists the attributes and their values for this feature.

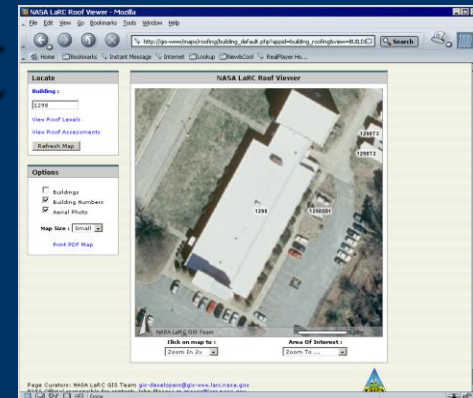
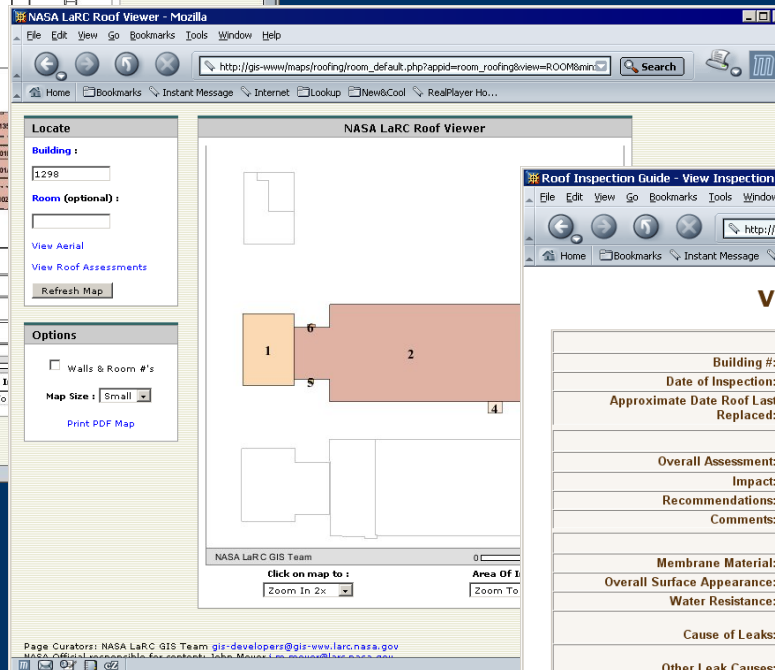
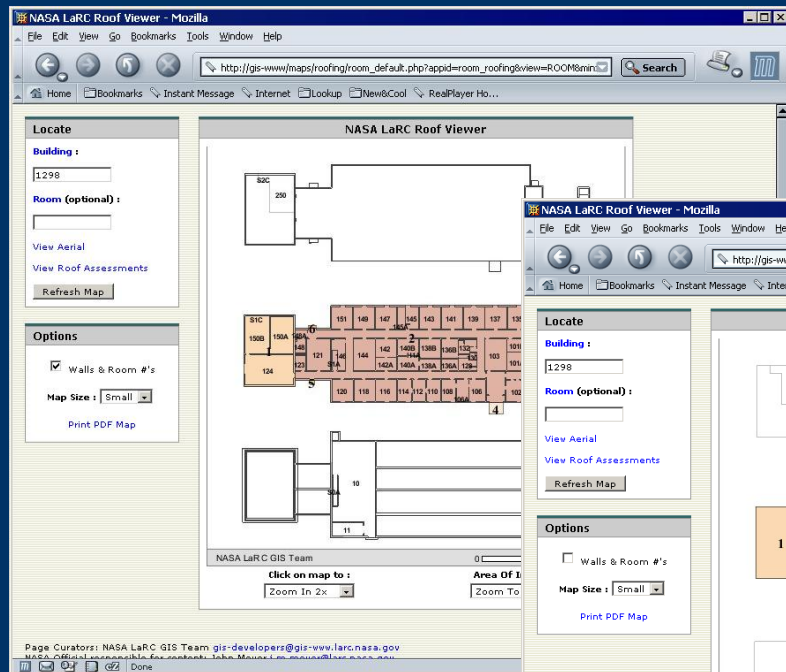
Field	Value
OBJECTID	34882
CONTAINER_OID	35920
DRAIN_TYPE	Plumbing
DRAIN_NUM	S-104-2
DRAWING_NAME	b1272
BLDG_NUM	1272
FLOOR_DESIGNATION	First
ROOM_NUM	104
SHAPE	Point
SANITATION_JUNCTION_OID	627
SYSTEM	SANITARY
STATUS	Active
DRAIN_SIZE	<null>
MANHOLE	115
DRAIN_TYPE_CDT	Plumbing
SYSTEM_CDT	SANITARY
STATUS_CDT	Active
DRAIN_SIZE_CDT	<null>
FLOOR_DESIGNATION_CDT	First

The Layers panel on the left shows the following layers:

- QC\_LARC.PRODUCTION (gis-db.k)
- SDE\_LARC.SanitationNetwork
  - ☒ SDE\_LARC.SANITATION
- SDE\_LARC\_EDIT.SanitationNetwork
  - ☒ SDE\_LARC\_EDIT.SANITATION
- GIS\_DBA.BUILDING
- QC\_LARC.PRODUCTION (gis-db.k)
- SDE\_LARC.MappedFloorplan
  - ☒ DRAIN
  - ☒ WALL
  - ☒ STAIRS
  - ☒ DOOR
  - ☒ ROOM NUMBER
  - ☒ WINDOW
- SDE\_LARC.SanitationNetwork
  - ☒ SANITATION MANHOLE
  - ☒ SANITATION EQUIPMENT
  - ☐ SANITATION LINE
- SDE\_LARC\_EDIT.StormNetwork
  - ☐ STORM MANHOLES
  - ☐ STORM EQUIPMENT
  - ☒ STORM LINE
  - ☐ STORM DITCH
- SDE\_LARC.Surface
  - ☒ STRUCTURE
    - ☐ Building
    - ☐ Trailer
    - ☐ Pump Station
    - ☐ Cooling Tower
    - ☐ Conex
    - ☐ Substation
    - ☐ Freezer
    - ☐ High Pressure
    - ☐ Monument
    - ☐ Misc
  - ☐ SLAB
  - ☒ ROAD
  - ☒ PARKING
  - ☒ AIRFIELD
  - ☒ SIDEWALK
  - ☒ CRACK

The bottom status bar shows the coordinates: 3688557.58 1087764.62 Meter.

# Maintenance – Condition Assessment



Roof Inspection Guide - View Inspection Entry - Mozilla

View Roof Inspection Entry

Inspection Identification	
Building #: 1298 (ACTIVE)	Level #: 2
Date of Inspection: 06/15/2004	Inspector: R.C. Owens
Approximate Date Roof Last Replaced: 01/01/1997	Contractor for Last Repair: Ducks Roofing Co, Inc

Condition Assessment	
Overall Assessment:	3 - Significant Repair (> 16 hours or > \$2000)
Impact:	Water Damage
Recommendations:	Patch and Seal Base Flashings.
Comments:	Adequate

Roof Membrane Inspection	
Membrane Material:	Asphalt. Graveled Surface.
Overall Surface Appearance:	Fair
Water Resistance:	No Leaks
Cause of Leaks:	-- N/A -- (No Leaks).
Other Leak Causes:	
Membrane Condition:	Smooth.
Comments:	Adequate

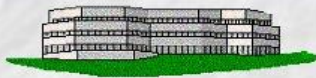
Flashings and Parapets Inspection	
Base Flashing Condition:	Disintegration of Surface.
Other Base Flashing Defects:	
Counter-Flashing:	
Metal Edges:	Other:





# Facility Full Costing

Tracks detailed utility and maintenance consumption by building, test facility, and organization. Data warehouse integrating multiple operational systems for a consolidated management view.



NASA Langley Research Center  
Facilities and Related Services  
Automated Monthly  
Expense Tracking System



## Fiscal Year 2007 Actual Expenditures (Through Sep) Scenario: 2007 Actuals


### Detailed Charge Breakdown for AERODYNAMICS FACILITIES

When an exact meter reading is available for a commodity, predominantly for high usage research consumers with exclusive metering (drive systems, ejectors, etc), the metered component is displayed in **orange** directly under the total units allocated for each utility. The portion of the electricity meter reading that was billed by Dominion Virginia Power at the higher excess energy rate, is displayed in **green** directly below the meter reading.

Utilities											
Measurement	Electricity Variable	Electricity Fixed	Gas Variable	Oil Variable	Water Variable	Water Fixed	Steam Variable	Steam Fixed	Compressed Air Variable	Compressed Air Fixed	Service Air Fixed
Consumption	42,007,013 kWh 30,581,683 kWh		87,386 CCF	100 GAL	5,532,628 GAL		44,527,040 LBS		81,521,957 LBS		111,599 MCF
Cost	<u>\$1,751,506.98</u> \$1,311,529	<u>\$764,494.27</u> \$542,340	<u>\$74,101.16</u>	<u>\$175.96</u>	<u>\$25,363.52</u>	<u>\$5,993.91</u>	<u>\$209,036.33</u>	<u>\$568,269.13</u>	<u>\$312,992.58</u>	<u>\$551,058.95</u>	<u>\$89,021.65</u>

Maintenance							Center Services		
Measurement	Routine Building Specific Variable	Routine Non-Building Specific Fixed	Support Variable	Facilities Maintenance Investment / Augmentation Variable	Custodial Variable	Grounds Fixed	Other Services Variable	Funded Projects Variable	Service Pool Labor Fixed
Cost	<u>\$1,987,607.05</u>	<u>\$509,819.22</u>	<u>\$133,587.36</u>	<u>\$1,903,581.35</u>	<u>\$159,867.48</u>	<u>\$64,068.36</u>	<u>\$109,442.28</u>	<u>\$144,914.52</u>	<u>\$543,856.34</u>

# Work Permit Process Management

**LARC Facilities Work Permit Request System**

Home Help Work Permit FAQ Logout

Home Admin Forms Work Permit Review Work Permit Report

Work Permit Review

Work Permit Approval Form for Permit Number: 271

Save Changes Cancel Display Work Permit

\* Requester Name GASBARR, SHANNON N - D402B - (757) 864-2190

Alternate POC CHARLES, ROBERT L. JR - D402C - (757) 864-7271

\* Performing Contractor Person Energy Systems Group/Water Management

\* Contract/Task Number>NNL09AB75D

\* Job Title/Description Utility Energy Service Contract for NASA Langley water retrofits includes installing modifying existing toilets & sinks. Every effort will be taken to minimize inconveniences to your facility. These modifications have been designed as water-saving measures for LaRC.

\* Estimated Cost 1000 Capital Improvement Project? ☐

Funding Category

\* Planned Start Date 10/05/2009

\* Planned Completion Date 10/06/2009

Facility Coordinators

1169 - SAFETY HEAD - WAGNER, WOODROW W. JR  
1169 - COORDINATOR - WAGNER, WOODROW W. JR

DAVIS, LEROY P.  
BRYAN, CHRISTOPHER

Facilities Impacted

Building #	FHP Impact (Yes/No)	Location	Room #	Hazardous Relevance
1169	No	Inside	107, 109	Not Applicable
1 - 1				

Associated Documents

No documents were submitted.

Upload New Attachment

Upload Attachments  
(i.e. SOW/Specs and Drawings)

Replacement File? ☐

Document Description

0 of 2000

Work Permit Life Cycle Management from User Submission, Safety Review and Approval, Quality Assurance Review and Approval, Permit Issuance, and Work Completion Inspection.

# Flood Analysis

**NASA LaRC Flood Impact Analysis Tool - Netscape**

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: [photo=0&forcedbldg=1&station=SEWELLS&datum=MLLW&height=2.5&units=METERS&bldg=&mapaction=ZOOMIN2&%addeddisplay=NONE](http://photo=0&forcedbldg=1&station=SEWELLS&datum=MLLW&height=2.5&units=METERS&bldg=&mapaction=ZOOMIN2&%addeddisplay=NONE)

Instant Message WebMail Radio People Yellow Pages Download Channels Calendar

---

**Analysis**

1. Station :  
Sewells Point

2. Datum :  
MLLW

3. Height Above :  
2.5  
☐ Feet ☒ Meters

4. Building (optional) :

Show

---

**Help**

Elevations for the majority of flood-prone facilities have been recently determined (1998) based on GPS measurements combined with traditional survey leveling.

Next Tip>>  
Need Help?

---

This map should not be used for survey accuracy.  
For more information, contact Brad Ball, w.b.ball@larc.nasa.gov

---

**NASA LaRC Flood Impact Analysis Tool**

Water level above NAVD88 : 1.90m

Legend

Full Map Extent

Click on map to : Zoom In 2x








NASA LaRC GIS Team

0 79.80m




## Legend

 Flooded Buildings

### Flooded Elevations

	Less Than 0.3 m
	0.3 - 0.6 m
	0.6 - 0.9 m
	0.9 - 1.2 m
	1.2 - 1.5 m
	1.5 - 1.8 m
	1.8 - 2.1 m

### Non-Flooded Elevations

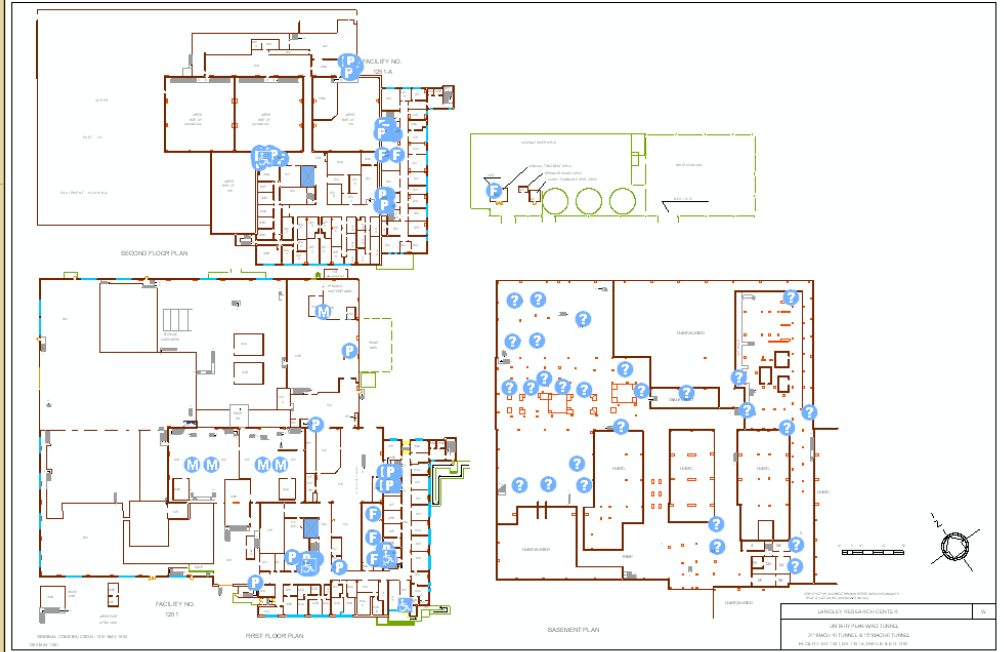
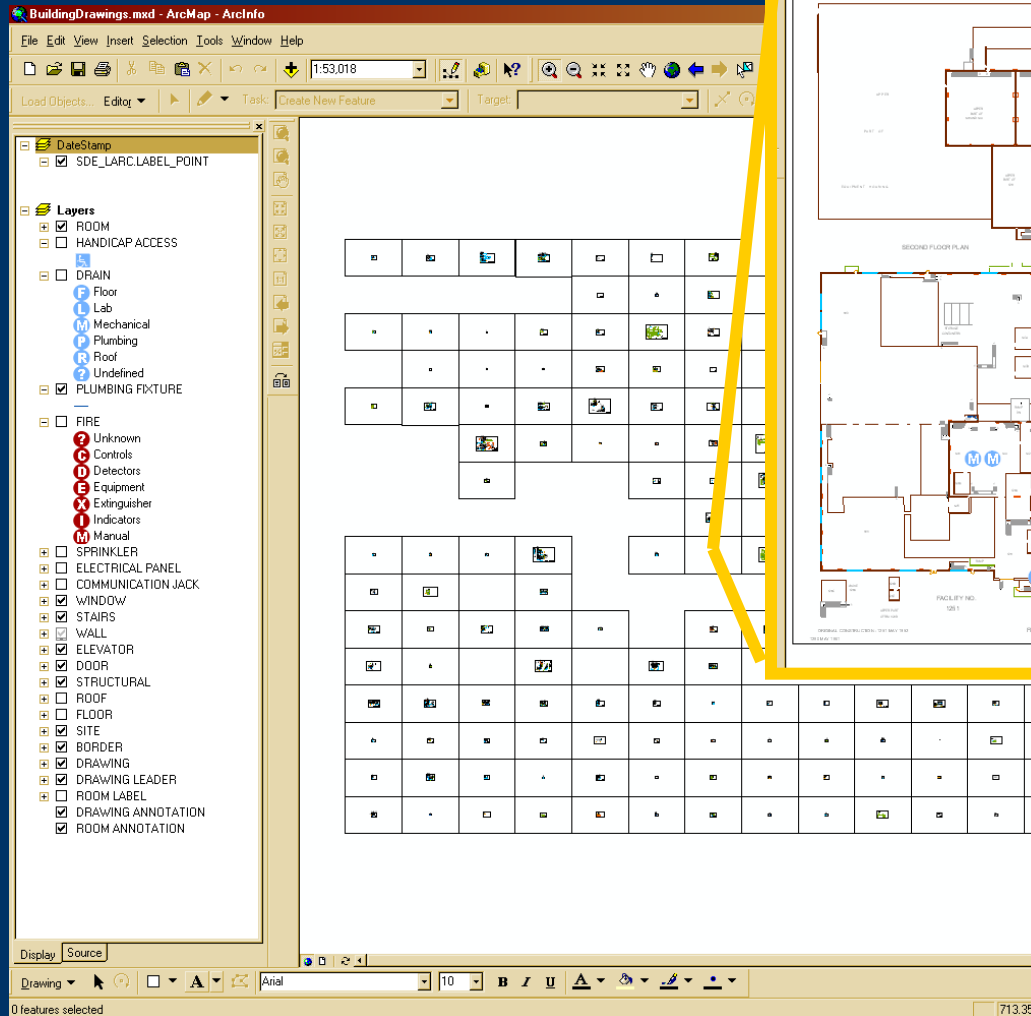
	2.1 - 2.4 m
	2.4 - 2.7 m
	2.7 - 3.0 m
	3.0 - 3.3 m
	3.3 - 3.6 m
	3.6 - 3.9 m
	3.9 m or More

Hide Legend



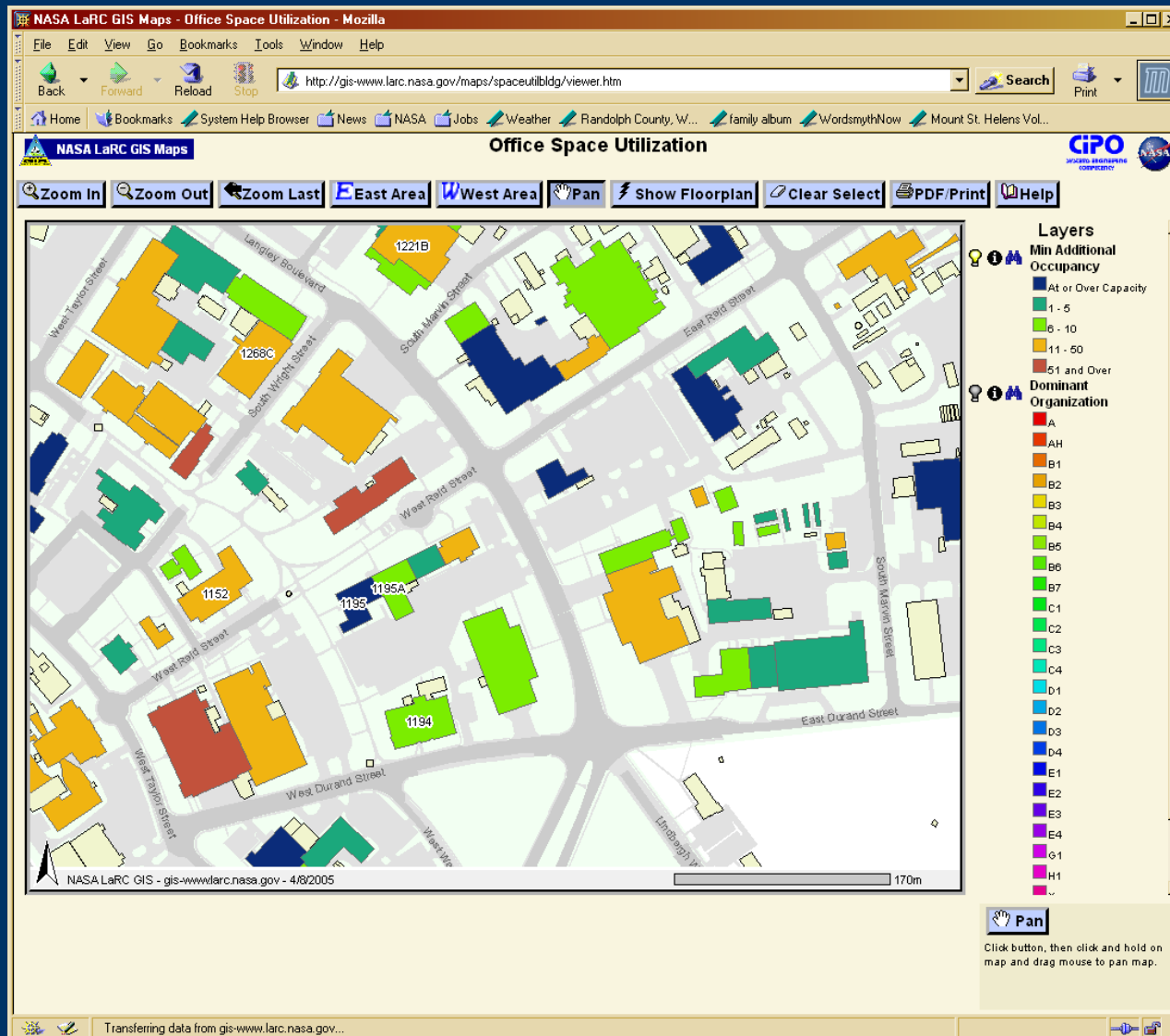


# Floor Plans That Map to Geographic Space




- Grid of all floor plans
- Single layer for each feature

# Space Utilization



# Conference Room Scheduling

 Home | Help

PRE-PRODUCTION TEST RELEASE

Home View Room Schedule View Building Schedule **Find Conference Room** My Meetings Schedule a One-Time Meeting Schedule a Recurring Meeting

Conference Room Search Criteria

Please enter Search criteria and select the 'Go' button to view available Conference Rooms matching your search criteria.

\* Meeting Date (MM/DD/YYYY)

\* Meeting Start Time  \* Meeting End Time

\* Room Configuration Type

Preferred Features (Select All Applicable Holding Down the Ctrl Key)

- ☐ None Required
- ☒ Conference Phone
- ☐ DVD Player
- ☐ Desktop Computer
- ☐ Executive Chairs

\* Number of Meeting Attendees  Display Rows

Order Results By: ☒ Building and Room # ☐ Highest # Preferred Feature Matches

Available Conference Rooms Matching Preferred Criteria - Ordered by Bldg #/Room #

Select Room	Bldg #	Room #	Floor #	Conference Room Type	Configuration Type	Room Features	Preferred Room Feature Matches	# Preferred Feature Matches	Area	Seating Capacity
<input type="radio"/>	001	220	2	Joint Use	BOARDROOM	Projector,Projector Screen,Desktop Computer,Wired Network Access,Microphone,Conference Phone,Webcam,Sound Recording,Executive Chairs,Sound Proofing,Video Recording,Video Conferencing,Speakers,Wireless Network Access,Laptop Display Plug-In,Plasma/LCD Monitor	Projector Screen,Laptop Display Plug-In,Conference Phone,Video Recording	4	684.00	47
<input type="radio"/>	001	360	3	Joint Use	BOARDROOM	Projector,Projector Screen,Laptop Display Plug-In,Desktop Computer,Wired Network Access,Wireless Network Access,Executive Chairs,Sound Proofing,Sound Recording,Video Recording,Webcam,Video Conferencing,Conference Phone,Speakers,Microphone,DVD Player,VCR Player,Plasma/LCD Monitor	Projector Screen,Conference Phone,Video Recording,Laptop Display Plug-In	4	1,010.00	85

☐ Training Classroom ☐ Other

Configuration Details

Phone # (281) 244-8547

Priority Details

Integrates Space Utilization Inventory and Usage Data, Building Floor Plans, and NASA Operational Messaging and Directory Service Meeting Request Notices.

Space Center  
RoomTool

**Room Photo**

Photo

**Room Features**

If a Go icon is shown below under the View Attachments column, the feature has an attachment(s) that has been downloaded. Select the attachment(s).

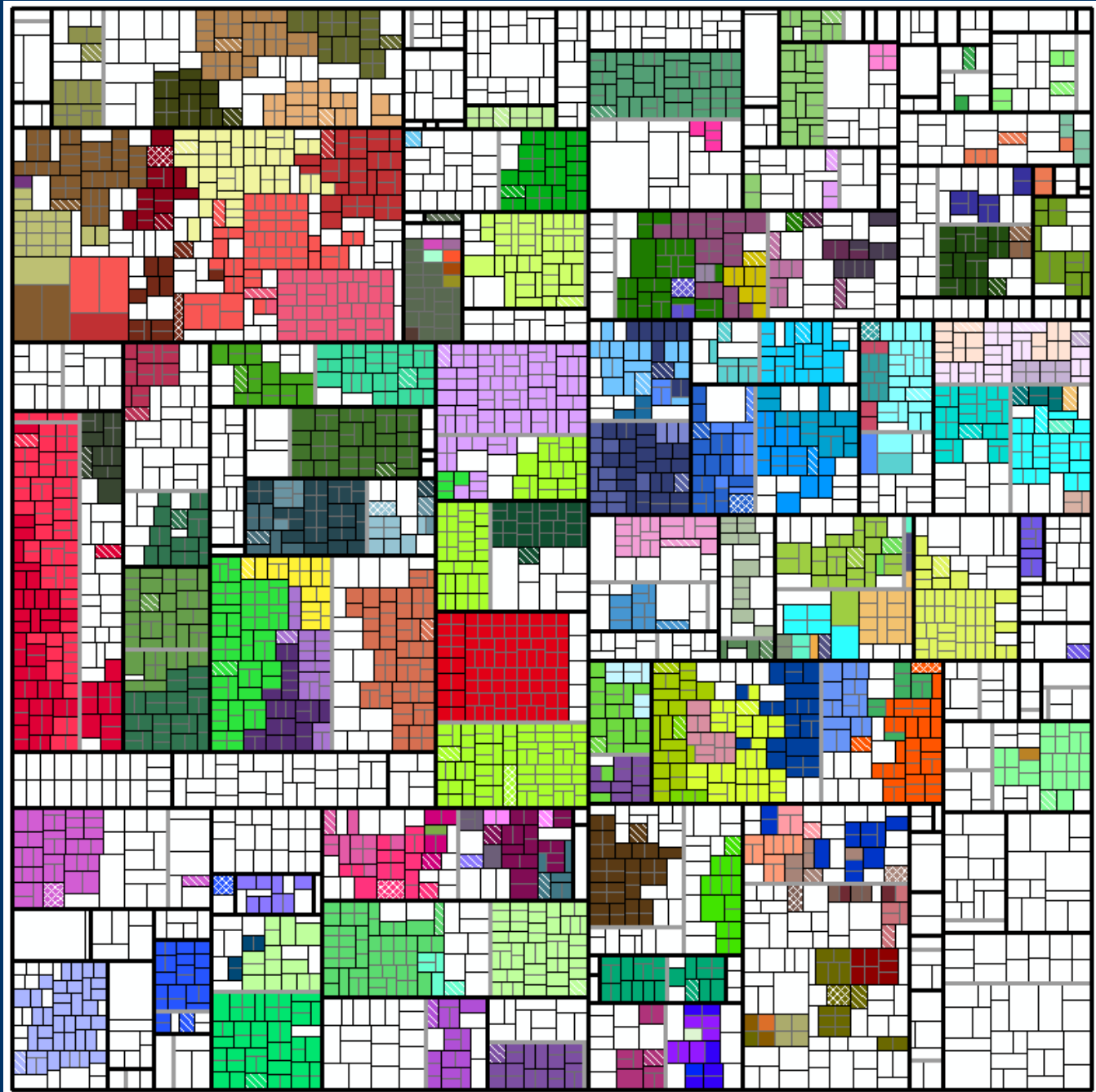
Feature Name	Number Available	POC Email Address	Usage Details
Projector	2		
Projector Screen	2		
Desktop Computer	6		





Spatial  
Subdivision  
Diagram

After  
Optimization

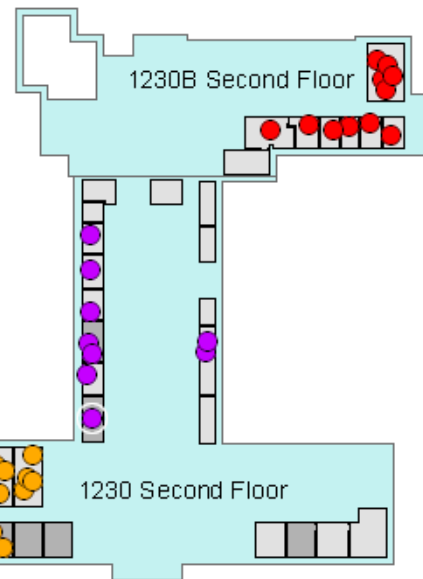


# One ~~NASA~~ Gov.





Partnering with Other Centers and Agencies





## Legend

### Room

-  Suitable for Employee Only
-  Potential Manager Office

## Early Random/Greedy Solution

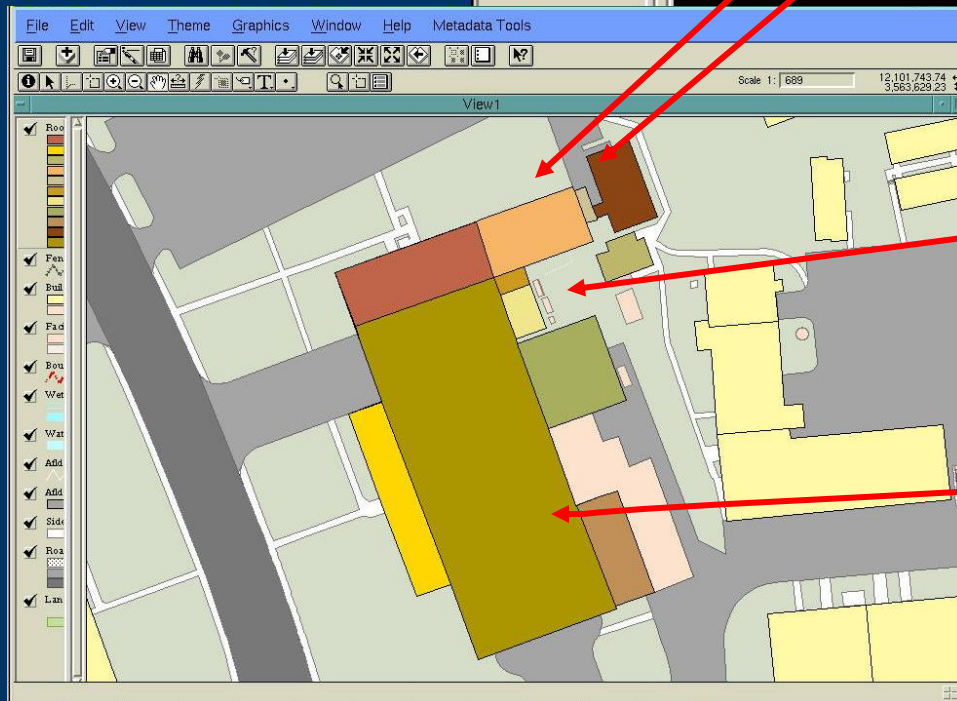
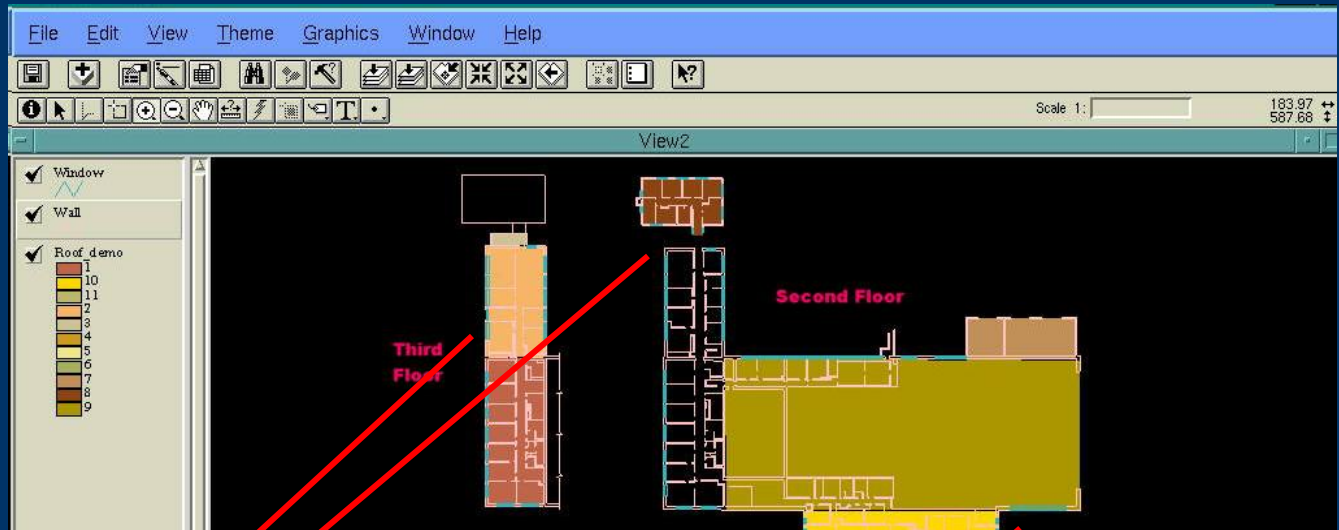
- Good Organizational Synergy
- Efficient Use Of Space
- Packing may be too tight





# Mapping Floorplans

Integrates  
Interior Bldg.  
Details



Roof example

# Spatial Transformation

- Just need a corresponding pair of lines for each floor
  - Drawing coordinates
  - Georeferenced

